

5448

Hr. Emil Weyr

IV. S. 92.

Analytische Geometrie.

Smoluchowski

6373

J. LUXANSKY
WIEN
IV. Wiedener Hauptstr. 20

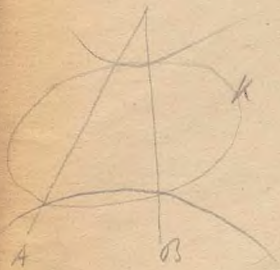
$\frac{1}{2} a_{11} x^2$

BJ

$\frac{1}{2} K$



$4x^2 \sim 2x^2$



$$A=0 \quad B=0$$

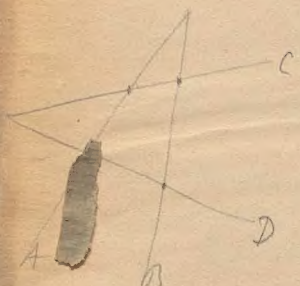
$$AB=0: \text{ is } \sim \mathcal{H}_1$$

$$K=0$$

$$K+\lambda AB=0 \quad \text{is } \sim \mathcal{H}_1$$

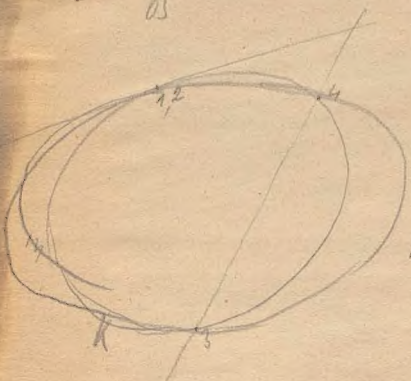
$$\text{is } \sim \mathcal{H}_1 \sim \mathcal{H}_2$$

$$K \sim \mathcal{H}_1$$



$$5 \mathcal{H}_1 \sim \mathcal{H}_2 \sim$$

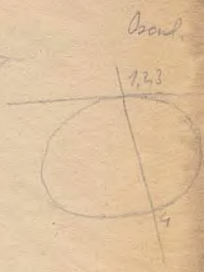
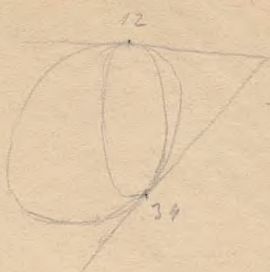
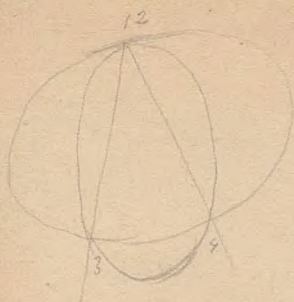
$$AB+\lambda CD=0$$



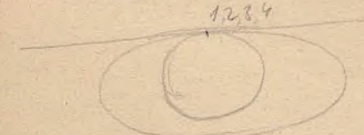
$\sim \mathcal{H}_1$ is a family of

$\sim \mathcal{H}_2$; 3 — incl.

$$K+\lambda AB=0$$



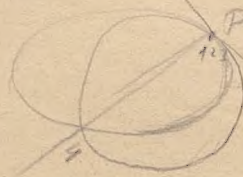
$$K + \lambda A^2 = 0$$



Circle 2, 4, 3, 1, 2, 3, 4

$\sim \gamma$ or 3∞ (if $\gamma \in C$) = Circle $\sim \gamma$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 = 0$$



$P(x', y')$ is on γ or γ^2 or γ^3
 P is the center

$$K + \lambda A^2 = 0$$

$$B = m(x-x') + n(y-y') = 0$$

$$\frac{xx'}{a^2} + \frac{yy'}{b^2} = -1$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - 1 + \lambda \left(\frac{xx'}{a^2} + \frac{yy'}{b^2} - 1 \right) [m(x-x') + n(y-y')] = 0$$

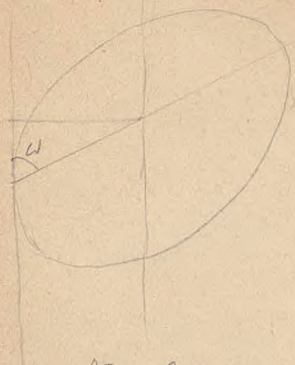
or γ : γ ———— iff $x^2 = (x-y)^2$ or

$\gamma \in P \sim \gamma^2$ or γ^3 or γ^4

$$K + \lambda K^2 = 0$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - 1 + \lambda \left[\frac{xx'}{a^2} + \frac{yy'}{b^2} - 1 \right]^2 = 0$$

or, Parallel $a_1, a_2, a_3^2 = 0$



$$\frac{x'^2}{a^2} + \frac{y'^2}{b^2} = 1$$

$$\frac{(x-d)^2}{a^2} + \frac{y^2}{b^2} = 1$$

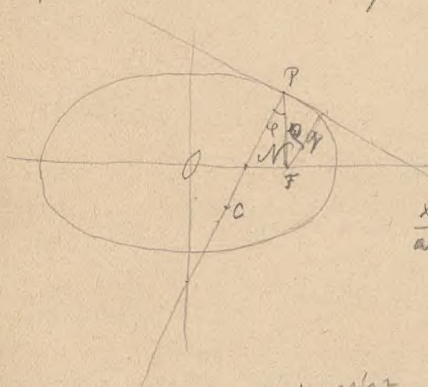
$$\frac{x^2}{a^2} - \frac{2xd}{a^2} + \frac{y^2}{b^2} = 0$$

$$r = -\frac{a_{1,3}}{a_{2,2} \sin \omega}$$

$$q_{12} = -\frac{1}{d'}$$

$$r = \frac{1}{d' \frac{\sin \omega}{d''}} = \frac{d''}{d' \sin \omega}$$

$$p = d' \sin \omega \quad r = \frac{d''}{p}$$



$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

$$C = x_0 y_0$$

$$\frac{x'x}{a^2} + \frac{y'y}{b^2} = 1$$

$$\frac{-x'b^2}{y'a^2}$$

$$\frac{y'a^2}{x'b^2} \text{ similar}$$

$$y - y' = \frac{y'a^2}{x'b^2} (x - x') \quad | \quad y = 0$$

$$x = -\frac{x'b^2}{a^2} + x' = PN = x' \frac{a^2 - b^2}{a^2}$$

$$PN^2 = \left[x' - x' \frac{a^2 - b^2}{a^2} \right]^2 + y'^2 = x'^2 \frac{b^4}{a^4} + y'^2 = \frac{b^2}{a^2} \left[\frac{b^2 x'^2}{a^2} + a^2 y'^2 \right]$$

$$PN = \frac{b d''}{a}$$

$$= d''$$

I

$$\rho = a - ex'$$

$$\cos \varphi = \frac{p}{\rho}$$

3

$$\frac{\frac{xx'}{a^2} + \frac{yy'}{b^2} - 1}{\sqrt{\frac{x'^2}{a^2} + \frac{y'^2}{b^2}}}$$

$$x=c$$

$$y=0 = q$$

$$q = 1 - \frac{cx'}{a^2}$$

$$\rho = \frac{ab(1 - \frac{cx'}{a^2})}{d'}$$

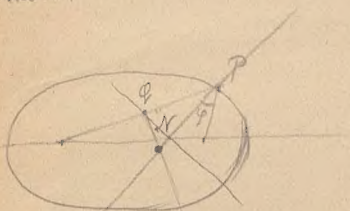
$$= \frac{b(a - ex')}{d'} = \frac{bp}{d''}$$

$$\cos \varphi = \frac{b'}{d''}$$

$$p = \frac{1}{\sqrt{\frac{x'^2}{a^4} + \frac{y'^2}{b^4}}} = \frac{ab}{\sqrt{\frac{b^2 x'^2}{a^2} + \frac{a^2 y'^2}{b^2}}} = \frac{ab}{d''}$$

$$r = \frac{d''^2}{\frac{ab}{d''}} = \frac{d''^3}{ab} = \frac{PN}{\cos \varphi}$$

Const.

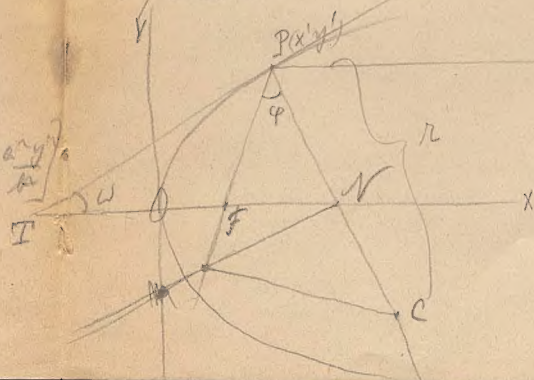


$$NQ + NP$$

$$PQ + PP$$

$$PP$$

Parabola:



$$y^2 = 2p'x$$

$$y^2 - 2p'x = 0 \quad p' = \frac{p}{\sin \omega}$$

$$r = -\frac{a_{1,3}}{a_{11}} \sin \omega$$

$$a_{12} = 1 \quad a_{13} = -p'$$

$$r = \frac{p'}{\sin \omega} = \frac{p}{\sin^3 \omega}$$

$$TN = p' = \frac{PN}{\cos^2 \varphi}$$

$$a_{11}x_1^2 + a_{21}x_1x_2 + a_{31}x_1x_3 + 2a_{12}x_1x_2 + 2a_{13}x_1x_3 + 2a_{23}x_2x_3 = 0$$

y

where η_1, η_2, η_3 

$$y_1(a_{11}x_1 + a_{12}x_2 + a_{13}x_3) + \\ + y_2(a_{21}x_1 + a_{22}x_2 + a_{23}x_3) + \\ + y_3(a_{31}x_1 + a_{32}x_2 + a_{33}x_3) = 0$$

$$a_{ik} = a_{ki}$$

D. 8. 7. 1

$$x_1(a_{11}y_1 + a_{12}y_2 + a_{13}y_3) + x_2(a_{21}y_1 + a_{22}y_2 + a_{23}y_3) +$$

$$+ x_3(a_{31}y_1 + a_{32}y_2 + a_{33}y_3) = 0$$

$$\begin{matrix} \swarrow C.C. & \swarrow C.C. \\ p.\eta_1 = a_{11}y_1 + a_{12}y_2 + a_{13}y_3 \end{matrix}$$

$$p.\eta_2 = a_{21}y_1 + a_{22}y_2 + a_{23}y_3$$

$$p.\eta_3 = a_{31}y_1 + a_{32}y_2 + a_{33}y_3$$

for $C.C.$ see p. 10

D. 8. 7. 1

$$y_1\eta_1 + y_2\eta_2 + y_3\eta_3 = 0$$

$$y_1\eta_1 + y_2\eta_2 + y_3\eta_3 = 0$$

$$\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = \text{Determinant}$$

$$by_1 = A_{11}\eta_1 + A_{12}\eta_2 + A_{13}\eta_3$$

$$by_2 = A_{21}\eta_1 + A_{22}\eta_2 + A_{23}\eta_3$$

$$by_3 = A_{31}\eta_1 + A_{32}\eta_2 + A_{33}\eta_3$$

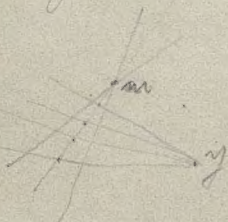
 $\left. \begin{matrix} \eta_1 \\ \eta_2 \\ \eta_3 \end{matrix} \right\} \begin{matrix} C.C. \\ C.C. \\ C.C. \end{matrix}$

$x, y \in \mathbb{R}^n, C, \text{ and } \lambda \in \mathbb{R}$

$$0 = A_{11}y_1^2 + A_{22}y_2^2 + A_{33}y_3^2 + 2A_{12}y_1y_2 + \dots$$

$$= \lambda^2 C_1 + \lambda C_2 + C_3$$

$e^{i\theta} e^{i\phi} = m_1 e^{i\theta} + m_2 e^{i\phi} + 2\lambda e^{i\theta}$



C_1, C_2, C_3 are the coefficients

$$y_1 (a_{11}m_1 + a_{12}m_2 + a_{13}m_3)$$

$$+ y_2 (\dots)$$

$$+ y_3 (\dots) = 0 \quad \text{with } y$$

$f(x, y) \text{ in } \mathbb{R}^n \text{ with } \text{Coeff.} = 0$

$$a_{11}m_1 + a_{12}m_2 + a_{13}m_3 = 0$$

$$a_{21}$$

$$a_{31}m_1 + \dots + a_{33}m_3 = 0$$

$\lambda_0 < \lambda \Delta$ if
 $\lambda \in \mathbb{R}$ and $\lambda \neq 0$

$\lambda_0 \in \mathbb{R}$ and $\lambda \neq 0$

$$m^2 + m_1 e^{i\theta} + m_2 e^{i\phi} = 0 \quad \text{with } \lambda \in \mathbb{R} \text{ and } \lambda \neq 0$$

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1

$$f_1 = f_2 = \dots = f_n = \dots = f_{n-1} = \dots = f_1$$

11

11

$$v = \pm i$$

$$f(z) = \frac{1}{z^2}$$

$$f(z) = \frac{1}{z^2}$$

$$f(z) = \frac{1}{z^2}$$

$$1, 2$$

$$= \frac{1}{z^2} = \frac{1}{(x+iy)^2} = \frac{1}{x^2-y^2+2ixy}$$

$$= \frac{1}{x^2-y^2+2ixy} \cdot \frac{x^2-y^2-2ixy}{x^2-y^2-2ixy} = \frac{x^2-y^2-2ixy}{(x^2-y^2)^2+4x^2y^2}$$

$$= \frac{x^2-y^2-2ixy}{(x^2-y^2)^2+4x^2y^2}$$

$$= \frac{x^2-y^2-2ixy}{(x^2-y^2)^2+4x^2y^2}$$

$$= \frac{x^2-y^2-2ixy}{(x^2-y^2)^2+4x^2y^2}$$

$$= \frac{1+i}{1-i} \frac{1+i}{1-i} = \frac{1+i}{1-i}$$

1. The first part of the paper is devoted to a general discussion of the subject.

2. The second part is devoted to a detailed examination of the various aspects of the problem.

3. The third part is devoted to a critical analysis of the existing literature on the subject.

4. The fourth part is devoted to a comparison of the results obtained with those of previous studies.

5. The fifth part is devoted to a discussion of the implications of the findings for future research.

6. The sixth part is devoted to a summary of the main conclusions of the study.

7. The seventh part is devoted to a list of references.

8. The eighth part is devoted to an appendix containing supplementary material.

9. The ninth part is devoted to a final conclusion.

1. 1. 1.

2. 2. 2.

3. 3. 3.



4. 4. 4.

5. 5. 5.

6. 6. 6.

7. 7. 7.

8. 8. 8.

9. 9. 9.

$\equiv \sqrt{2}$

$\frac{1}{2} \sqrt{2} = \dots$ $u^2 + v^2 = \frac{M^2}{2}$

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$$V = K \cdot \tau$$

$$K = \frac{V}{\tau} = \frac{V}{\frac{V}{K}} = K$$

$$K = \frac{V}{\tau} = \frac{V}{\frac{V}{K}} = K$$

$$\log \frac{V}{\tau} = \log K + \log \frac{V}{\tau} = \log K + \log \frac{V}{\tau}$$

$$\log \frac{V}{\tau} = \log K + \log \frac{V}{\tau} = \log K + \log \frac{V}{\tau}$$

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$$\log \frac{V}{\tau} = \log K + \log \frac{V}{\tau} = \log K + \log \frac{V}{\tau}$$

$$\left(\frac{\partial T_1}{\partial T_2} \right)^2 = 1 \quad \frac{\partial T_1}{\partial T_2} = \sqrt{2}$$

$$\log \frac{V}{\tau} = \log K + \log \frac{V}{\tau} = \log K + \log \frac{V}{\tau}$$

Thomson's

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$$\overline{PQ} \cdot \overline{QR} = \overline{PR} \cdot \overline{PQ} \cdot \overline{QR}$$

P.

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$$OP = u$$

$$u^2 + v^2 = r^2$$

$$x^2 + y^2 = z^2 + w^2 + \dots$$

$$u^2 + v^2 = z^2 + w^2 + \dots = 6 \quad 2u = d'$$

$$x^2 + y^2 = d^2 + \dots = 10 \quad \dots = 10$$

1. The first part of the book

is devoted to the history

of the country and the people

who lived there in the past

and the changes that have taken place

since the first settlement

was made

in the year 1600

and the progress of the country

since that time

is described in the second part

of the book

and the third part

contains a description of the

present state of the country

and the prospects for the future

of the country

and the prospects for the future

$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

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$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

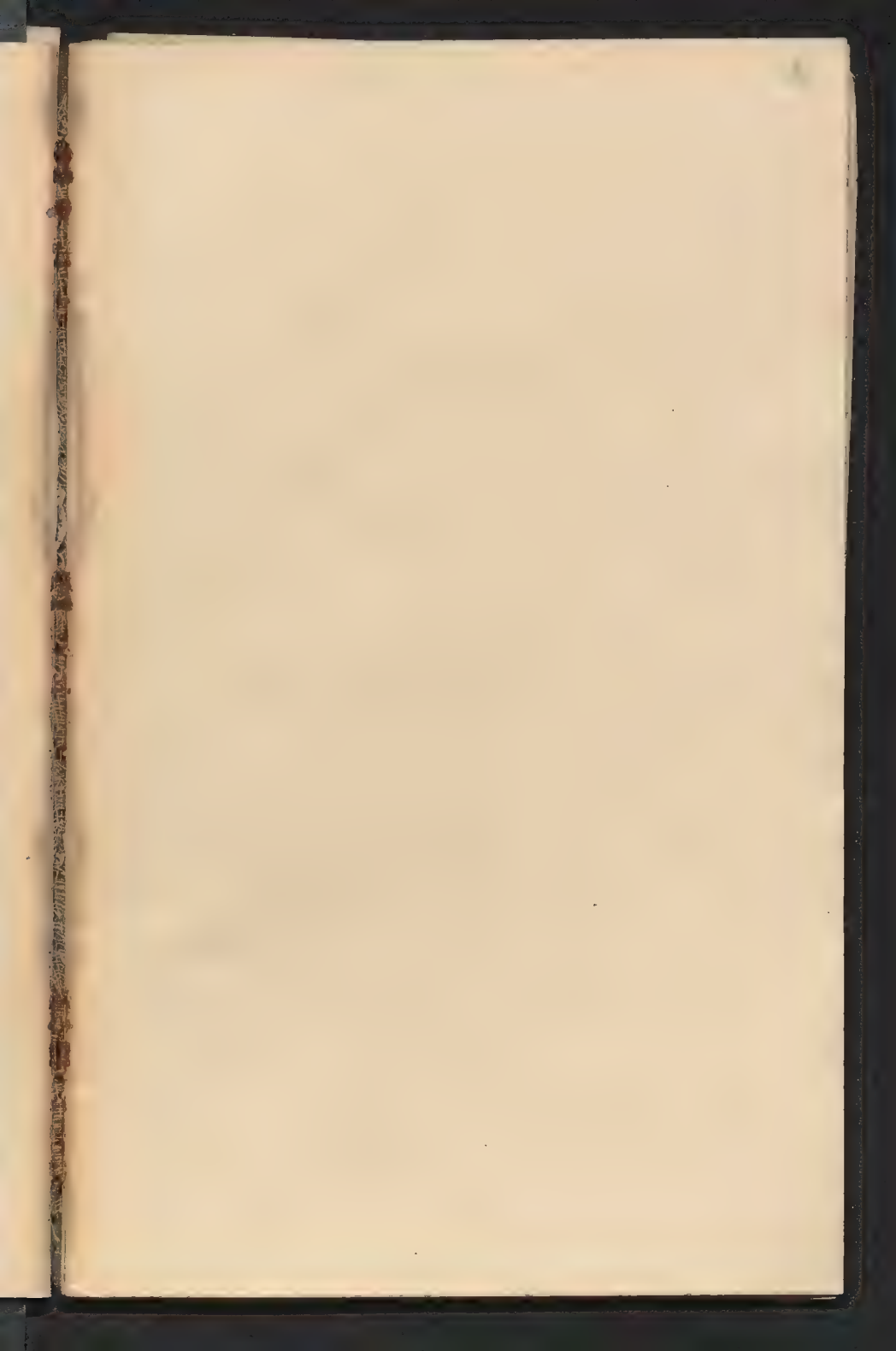
$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

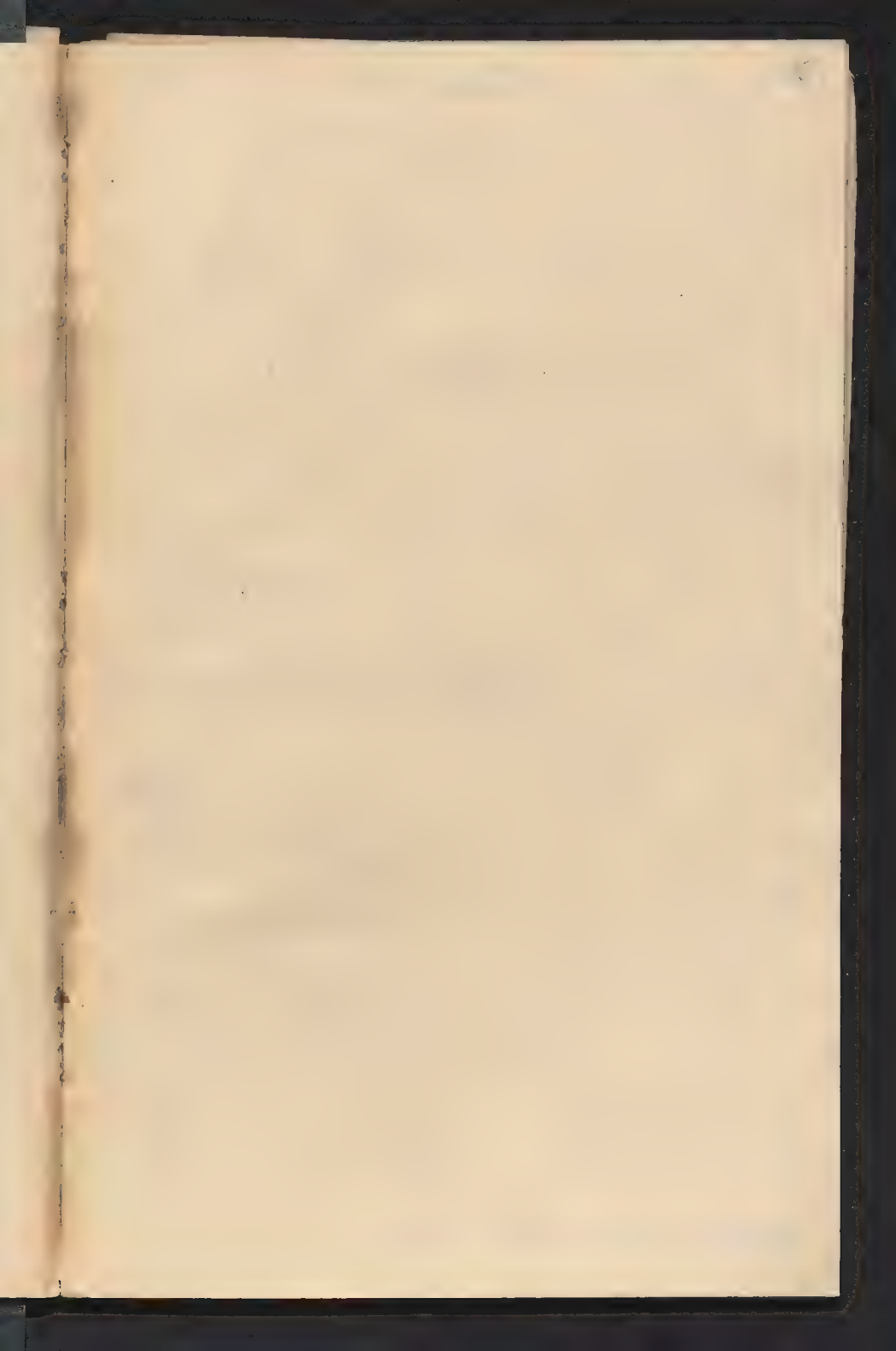
$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

$$= \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) = \frac{1}{2} \left(\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right)$$

$$\begin{vmatrix} x_1 & x_2 & x_3 & 1 \\ c_1 & c_2 & c_3 & 1 \\ c_4 & c_5 & c_6 & 1 \\ c_7 & c_8 & c_9 & 1 \end{vmatrix} = 0 \quad \text{by definition}$$





1/2 ...

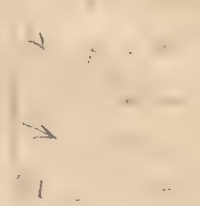
$$2 - \dots = \dots$$

$$d - \dots = \dots$$



$$n - \dots = \dots$$

$$c - \dots = \dots$$



$$i - \dots = \dots$$

$$x^2 - i^2 = c_i \quad i=1$$

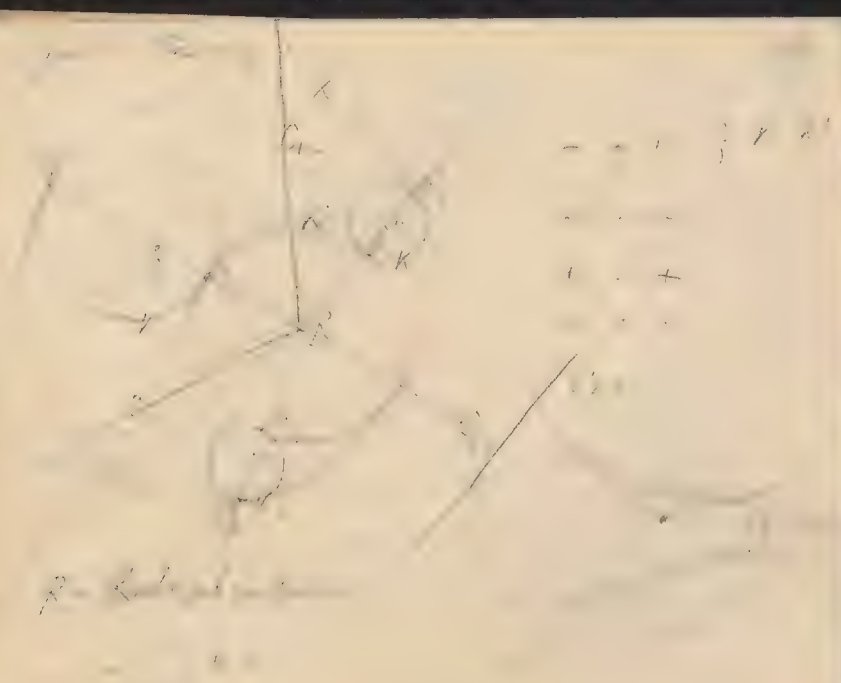
$$t + c_i = 2a_i + 2b_i + 2c_i$$

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129

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7. 1. 1911

$$\frac{1}{2} = \frac{1}{2} \cdot 1$$

$$\frac{1}{2} = \frac{1}{2} \cdot 1$$

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$$\frac{1}{2} = \frac{1}{2} \cdot 1$$

1. 1. 1911



$$\frac{1}{2} = \frac{1}{2} \cdot 1$$

$$a_{11}x^2 + a_{12}x + a_{13} = 0$$

$$a_{11}x^2 + a_{12}x + a_{13} = 0$$

$$a_{11}x^2 + a_{12}x + a_{13} = 0$$

$$-\frac{a_{12}}{a_{11}} = -\frac{a_{12}}{a_{11}}$$

$$\frac{x^2}{2} + \frac{x}{2} = 1$$

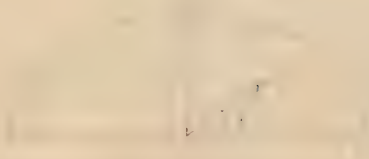
2-12-1

1000 ft

20
30
40



1000 ft



$$\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$$

$$1 - \frac{1}{2} = \frac{1}{2}$$

$$1 - \frac{1}{4} = \frac{3}{4}$$

$$1 - \frac{1}{2} = \frac{1}{2}$$

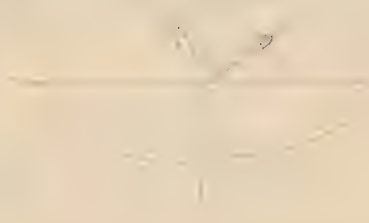
$$1 - \frac{1}{4} = \frac{3}{4}$$

depth
1000 ft

$$1 - \frac{1}{4} = \frac{3}{4}$$

$$1 - \frac{1}{2} = \frac{1}{2}$$

$$1 - \frac{1}{4} = \frac{3}{4}$$



2-2-2-2-2

1-1-1-1-1

1-1-1-1-1

1-1-1-1-1

1-1-1-1-1



1-1-1-1-1

~~1-1-1-1-1~~

$$OP' = 1/11$$

$$OP' = 1/11$$

$$OP' = 1/11$$

$$OP' = 1/11$$



$$\frac{d}{dt} \left(\frac{1}{2} \pi r^2 \right) = \pi r \frac{dr}{dt}$$

$$\frac{d}{dt} \left(\frac{1}{2} \pi r^2 \right) = \pi r \frac{dr}{dt} \quad (1)$$

$$\frac{d}{dt} \left(\frac{1}{2} \pi r^2 \right) = \pi r \frac{dr}{dt}$$

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$$\frac{d}{dt} \left(\frac{1}{2} \pi r^2 \right) = \pi r \frac{dr}{dt}$$

$$\frac{d}{dt} \left(\frac{1}{2} \pi r^2 \right) = \pi r \frac{dr}{dt}$$

$$\frac{d}{dt} \left(\frac{1}{2} \pi r^2 \right) = \pi r \frac{dr}{dt}$$

$$\frac{d}{dt} \left(\frac{1}{2} \pi r^2 \right) = \pi r \frac{dr}{dt}$$

$$\frac{d}{dt} \left(\frac{1}{2} \pi r^2 \right) = \pi r \frac{dr}{dt}$$

1. 1. 1. 1.

1. 1. 1. 1.

1. 1. 1. 1.

1. 1. 1. 1.

$$\frac{1}{x^2} = x^{-2}$$

1. 1. 1. 1.

$$\frac{d}{dx} x^{-2} = -2x^{-3}$$

$$= -\frac{2}{x^3}$$

1. 1. 1. 1.

1. 1. 1. 1.

$$\frac{d}{dx} x^{-3} = -3x^{-4}$$

$$= -\frac{3}{x^4}$$

$$= -\frac{3}{x^4}$$

$$= -\frac{3}{x^4}$$

$$d^2 = a^2 - a^2$$

1. 1. 1. 1.

1. 1. 1. 1.

1. 1. 1. 1.



Figure 1

Figure 2

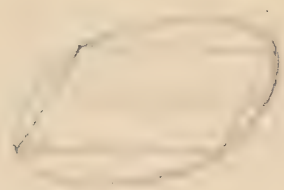
Figure 3

Figure 4

Figure 5

Figure 6

Figure 7



Handwritten notes and diagrams in the upper section of the page, including a small sketch of a structure with a vertical line and horizontal bars.

Handwritten notes and diagrams in the middle section of the page, featuring a larger sketch of a circular structure with internal lines.

Handwritten notes and diagrams in the lower section of the page, including a small sketch of a structure with a vertical line and horizontal bars.

1. ...

2. ...

3. ...

4. ...

5. ...

6. ...



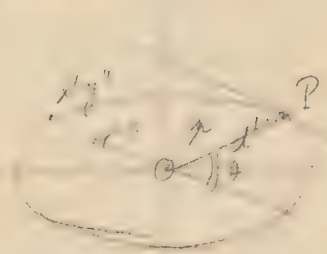
7. ...

8. ...

9. ...

10. ...

11. ...



$$\frac{a^2}{b^2} = \frac{a^2}{b^2}$$

$$\frac{a^2}{b^2} = \frac{a^2}{b^2}$$

$$\frac{a^2}{b^2} = \frac{a^2}{b^2}$$

$$P = \frac{1}{\sqrt{\frac{a^2}{b^2} + \frac{b^2}{a^2}}}$$

$$= \frac{ab}{\sqrt{a^2 + b^2}} = \frac{ab}{\sqrt{a^2 + b^2}} = \frac{ab}{\sqrt{a^2 + b^2}}$$

$$\frac{1}{x^2} = x^{-2}$$

$$\frac{d}{dx} x^{-2} = -2x^{-3}$$

$$= -\frac{2}{x^3}$$

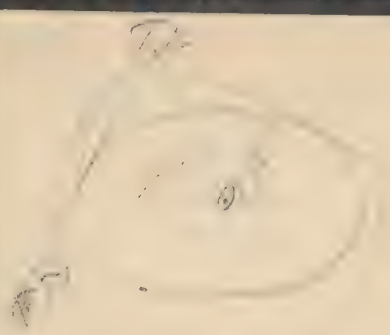
$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$$



$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$$





$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

...

...

...

$$f = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

...

...

...

$$f = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

...

...

...

$$x_2 = -x_{12} \pm \sqrt{1 - x_{12}^2}$$

$$x_{12} = \frac{1}{2} (1 - x_{12})$$

$$\frac{1 + x_{12} \pm \sqrt{1 - x_{12}^2}}{2} = \frac{1 \pm \sqrt{1 - x_{12}^2}}{2}$$

$$x_{12} = \frac{1}{2} (1 - x_{12}) - \frac{1}{2} (1 - x_{12}) = 0$$

$$x_{12} = -\frac{1}{2} (1 - x_{12})$$

$$x_{12} = -\frac{1}{2} (1 - x_{12})$$

$$x_{12} = \frac{1}{2} (1 - x_{12})$$

1000 $\sqrt{\frac{1}{2} - \frac{1}{2} \cos \theta}$

$\frac{1}{2} \cos \theta = \frac{1}{2} \cos \theta$

$$= \frac{1}{2} \sqrt{1 - \cos^2 \theta} = \frac{1}{2} \sin \theta$$

$$= \frac{1}{2} \sin \theta$$

$$= \frac{1}{2} \sin \theta$$

...

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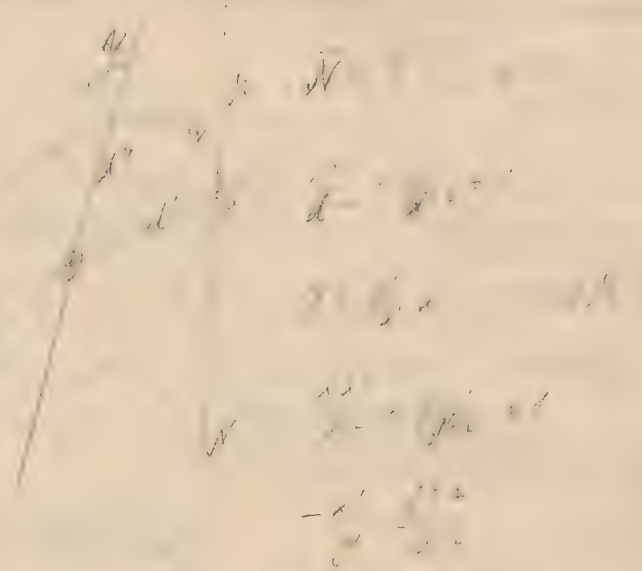
...

...

$\frac{d^2 y}{dx^2} = -\frac{1}{r^3} y$
 $\frac{d^2 y}{dx^2} + \frac{1}{r^3} y = 0$

$\frac{d^2 y}{dx^2} = -\frac{1}{r^3} y$

$\frac{d^2 y}{dx^2} = -\frac{1}{r^3} y$



$\frac{d^2 y}{dx^2} = -\frac{1}{r^3} y$

$\frac{d^2 y}{dx^2} = -\frac{1}{r^3} y$

$\frac{d^2 y}{dx^2} = -\frac{1}{r^3} y$

17. 11. 1907

22

1. 1. 1908

2. 2. 1908

3. 3. 1908

4. 4. 1908

21

1. $\frac{dy}{dx} = \frac{y}{x}$

2. $\frac{dy}{dx} = \frac{y}{x} + \frac{1}{x^2}$

3. $\frac{dy}{dx} = \frac{y}{x} - \frac{1}{x^2}$

4. $\frac{dy}{dx} = \frac{y}{x} + \frac{1}{x^2}$ (repeated)

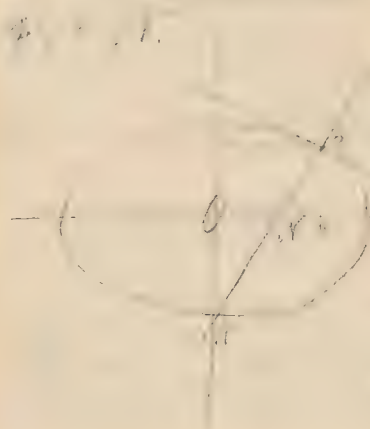
5. $\frac{dy}{dx} = \frac{y}{x} - \frac{1}{x^2}$ (repeated)

6. $\frac{dy}{dx} = \frac{y}{x} + \frac{1}{x^2}$

7. $\frac{dy}{dx} = \frac{y}{x} - \frac{1}{x^2}$

8. $\frac{dy}{dx} = \frac{y}{x} + \frac{1}{x^2}$

9. $\frac{dy}{dx} = \frac{y}{x} - \frac{1}{x^2}$



$$\frac{dy}{dx} + \frac{y}{x} = 1$$

$$= -\frac{1}{x} \frac{dy}{dx}$$

$$\int \frac{1}{x} \frac{dy}{dx} dx = \int \frac{1}{x} dx$$

$$\ln|y| = \ln|x| + \ln|C|$$

$$\ln|y| = \ln|Cx|$$

$$y = Cx$$

$$\frac{1}{x^2} = x^{-2}$$

$$d\left(x^{-2}\right) = -2x^{-3} dx$$

$$= -\frac{2}{x^3} dx$$

$$= -\frac{2}{x^3}$$

$$= -\frac{2}{x^3}$$

$$= -\frac{2}{x^3}$$

$$= -\frac{2}{x^3}$$

$$= -\frac{2}{x^3}$$

$$\frac{1}{x^2} = x^{-2} \Rightarrow \frac{d}{dx} x^{-2} = -2x^{-3}$$

$$= -\frac{2}{x^3}$$

$$= -\frac{2}{x^3}$$

$$= -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3} \quad \left(\frac{1}{x^2} = x^{-2} \right)$$

$$\left\{ \begin{aligned} \frac{d}{dx} \left(\frac{1}{x^2} \right) &= -\frac{2}{x^3} \\ \frac{d}{dx} \left(\frac{1}{x^3} \right) &= -\frac{3}{x^4} \end{aligned} \right.$$

$\frac{1}{2} \text{ of } \frac{1}{2} \text{ of } \frac{1}{2}$
 $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$
 $\frac{1}{8}$

1. $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$
 2. $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$
 3. $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$
 4. $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$



$(F' E' VT) = -1$
 $\angle IPT = 90^\circ$
 $\overline{PE} \overline{VE}$

11. 2. 11

12. 2. 11

13. 2. 11

14. 2. 11

15. 2. 11

16. 2. 11

17. 2. 11

18. 2. 11

19. 2. 11

20. 2. 11

21. 2. 11

22. 2. 11

23. 2. 11

24. 2. 11

25. 2. 11

26. 2. 11

27. 2. 11

$\frac{1}{x^2} = x^{-2}$
 $\frac{d}{dx} x^{-2} = -2x^{-3}$
 $= -\frac{2}{x^3}$

$\frac{d}{dx} \frac{1}{x^2} = -\frac{2}{x^3}$
 $\frac{d}{dx} x^{-2} = -2x^{-3}$

$$\frac{d}{dx} \frac{1}{x^2} = -\frac{2}{x^3}$$

$$\frac{d}{dx} x^{-2} = -2x^{-3}$$

$$\frac{d}{dx} \frac{1}{x^2} = -\frac{2}{x^3}$$

$$\frac{d}{dx} x^{-2} = -2x^{-3}$$

$$\frac{d}{dx} \frac{1}{x^2} = -\frac{2}{x^3}$$

$$\frac{d}{dx} x^{-2} = -2x^{-3}$$



$$\frac{x}{a} + \frac{y}{b} = 1$$

of the line is 0

the line is

$$x = \pm \frac{a}{2}, y = \pm \frac{b}{2}$$

$$x = \pm \frac{a}{2}$$

the line is

$$x = \pm \frac{a}{2}$$

$$\frac{x}{a} + \frac{y}{b} = 1$$

$$\frac{x}{a} = \frac{a}{2}$$

$$\frac{x}{a} = \frac{a}{2}$$

$$\frac{q^2}{2} - \frac{q^2}{2} - \frac{q^2}{2}$$

$$1 \pm 1$$

$$q^2 = 0$$

$$0.18 \quad - \quad 192$$

$$1.11 \times 10^4$$

$$q^2 = 0.9 - 0.9 \sqrt{1}$$

$\frac{1}{x} = x^{-1}$
 $\frac{d}{dx} x^{-1} = -1 x^{-2} = -\frac{1}{x^2}$

$\frac{d}{dx} x^{-2} = -2 x^{-3} = -\frac{2}{x^3}$
 $\frac{d}{dx} x^{-3} = -3 x^{-4} = -\frac{3}{x^4}$

$\frac{d}{dx} x^{-4} = -4 x^{-5} = -\frac{4}{x^5}$
 $\frac{d}{dx} x^{-5} = -5 x^{-6} = -\frac{5}{x^6}$

$\frac{d}{dx} x^{-6} = -6 x^{-7} = -\frac{6}{x^7}$
 $\frac{d}{dx} x^{-7} = -7 x^{-8} = -\frac{7}{x^8}$

$\frac{d}{dx} x^{-8} = -8 x^{-9} = -\frac{8}{x^9}$
 $\frac{d}{dx} x^{-9} = -9 x^{-10} = -\frac{9}{x^{10}}$

$\frac{d}{dx} x^{-10} = -10 x^{-11} = -\frac{10}{x^{11}}$
 $\frac{d}{dx} x^{-11} = -11 x^{-12} = -\frac{11}{x^{12}}$

$\frac{d}{dx} x^{-12} = -12 x^{-13} = -\frac{12}{x^{13}}$
 $\frac{d}{dx} x^{-13} = -13 x^{-14} = -\frac{13}{x^{14}}$

22

U

Y

U = 1

V

D

F

U

Y

Y

$$(x-2)^2 + 2x^2$$

$$x^2 - 4x + 4$$

$$x^2 - 4x + 4$$

$$D U = U F = 1$$

$$y = 1$$

$$x = 2 + \sqrt{3}$$

$$y' = \frac{1}{2} (x - 2) - \frac{1}{2} (x - 2) = 0$$



$$f(x) = \frac{1}{2} \left(\frac{x^2}{2} + \frac{1}{x^2} \right) = \frac{x^2}{4} + \frac{1}{2x^2}$$

$$f'(x) = \frac{1}{2} \left(\frac{2x}{2} - \frac{2}{x^3} \right) = \frac{x}{2} - \frac{1}{x^3}$$

$$f''(x) = \frac{1}{2} \left(1 + \frac{6}{x^4} \right) = \frac{1}{2} + \frac{3}{x^4}$$

$$\frac{x^2}{2} = \frac{1}{2} x^2$$

$$\frac{x^2}{2} = \frac{1}{2} x^2$$

$$\sqrt{\frac{x^2}{2} + \frac{1}{2x^2}}$$

$$f' = \frac{1 - \frac{1}{x^3}}{2}$$

$$\sqrt{\frac{x^2}{2} + \frac{1}{2x^2}}$$

$$= \frac{\left(1 - \frac{1}{x^3}\right) \frac{1}{2}}{\sqrt{\frac{x^2}{2} + \frac{1}{2x^2}}} = \frac{1 - \frac{1}{x^3}}{2\sqrt{\frac{x^2}{2} + \frac{1}{2x^2}}}$$

$$= \frac{1}{2\sqrt{2}}$$

$$\frac{1}{2} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2}$$

$$f' = \frac{1 - \frac{1}{x^3}}{2\sqrt{\frac{x^2}{2} + \frac{1}{2x^2}}} = \frac{1}{2\sqrt{2}}$$

$$\frac{1}{2\sqrt{2}}$$

1. *Trachyura*

2. *Trachyura*

3.

4.

5. *Trachyura*

6. *Trachyura*

7. *Trachyura*

8. *Trachyura*

9.

10.

11.

12. *Trachyura*

13. *Trachyura*

14. *Trachyura*

15. *Trachyura*

16. *Trachyura*

17. *Trachyura*

18.

19.

20. *Trachyura*

21. *Trachyura*

1844-1845

1846-1847

1848-1849

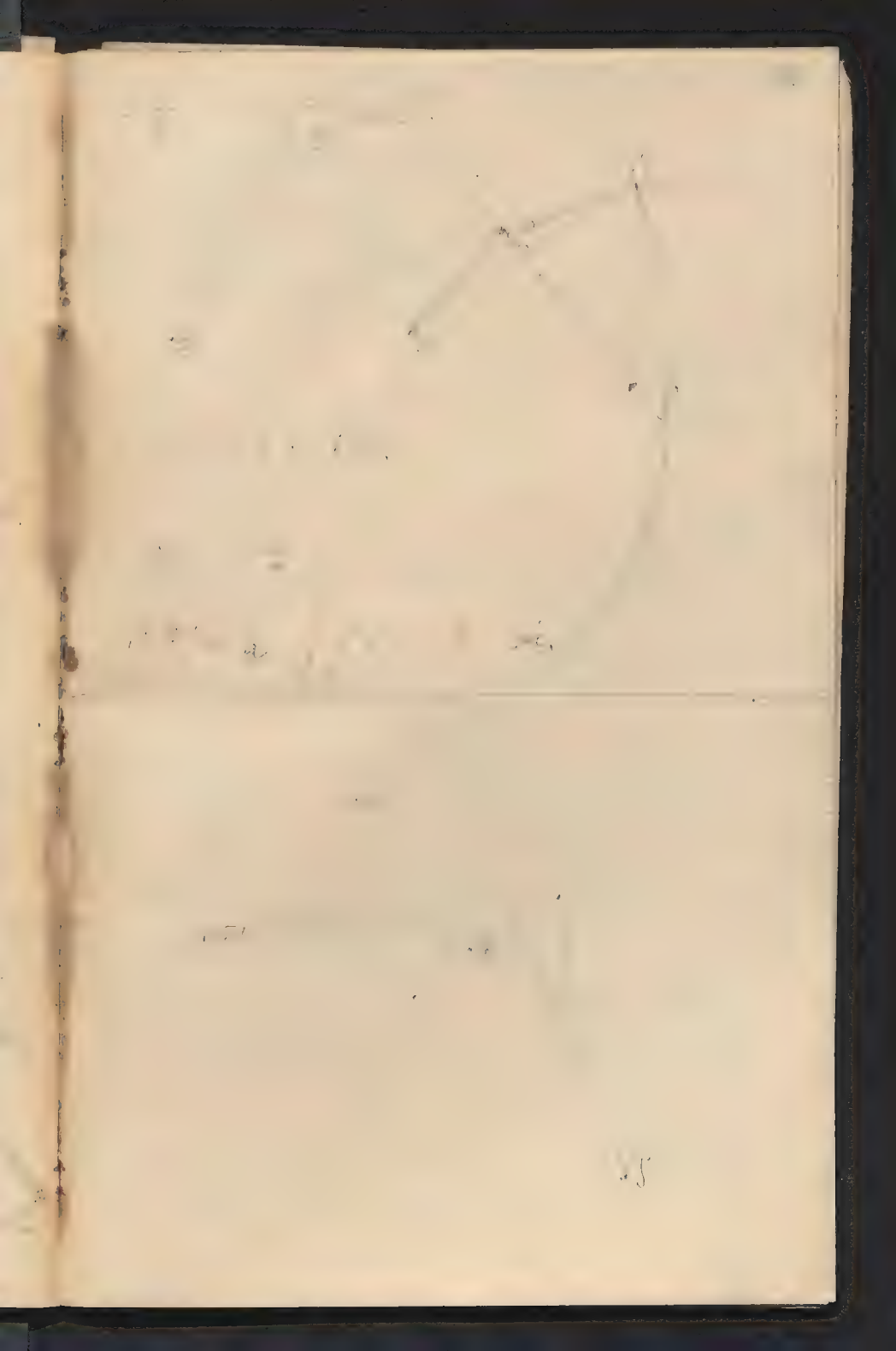
1850-1851

1852-1853



1854-1855

1856-1857



18 12 18 18

18 12 18 18

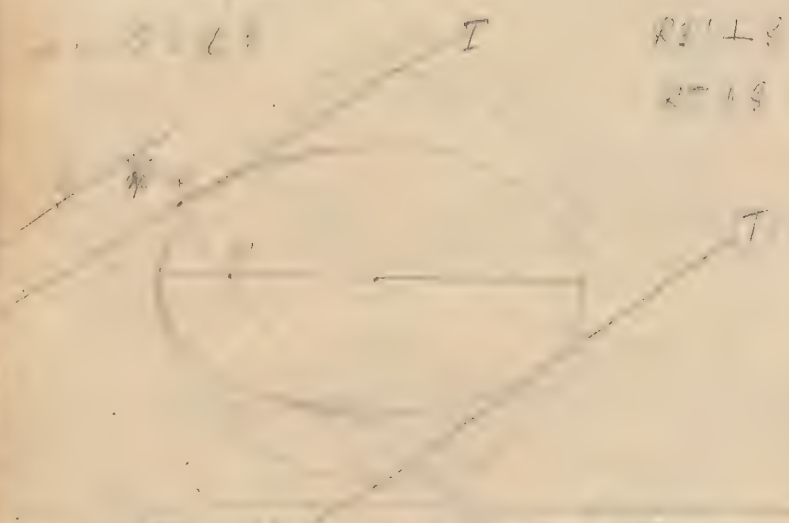
18 12 18 18





... 2.2

$R \perp L$
 $R \perp L$



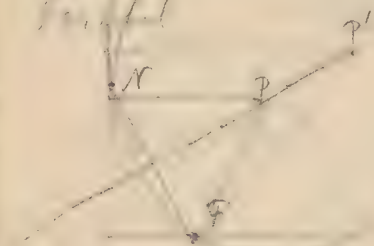
(1)



$\frac{1}{2} \sqrt{10}$
 $\Delta P_1 - \Delta P_2$
 $\frac{1}{2} H P_1 - \Delta P_2$
 $\frac{1}{2} H P_1 - \Delta P_2$

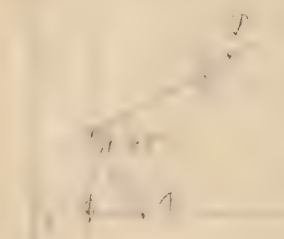
... ..

Fig. 1



$$PP' \perp EF$$

$\pi, -\pi$



17.12

$-1 D_0$

$-C_0$

$\pi = 0$

$\pi = \pi$



$10 = \sqrt{100} = 10$



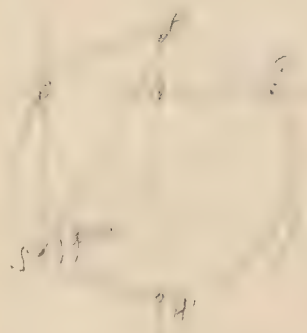
$10 = 10$



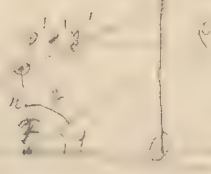
$\pi = -10.1$



7



4 1 8



$c' p$

$$= a' - y$$

$$c' y = \frac{x + c}{2}$$

$$c' y' = \frac{x' - c}{2}$$

$$c' y' = \frac{x' - c}{2}$$

1. $\frac{d}{dx} \left(\frac{1}{x^2} \right) = \frac{d}{dx} x^{-2} = -2x^{-3} = -\frac{2}{x^3}$

$$= \frac{-2x^{-3}}{1} = -\frac{2}{x^3}$$

$$\frac{d}{dx} x^{-2} = -2x^{-3}$$

$$= -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = \frac{d}{dx} x^{-2} = -2x^{-3} = -\frac{2}{x^3}$$

$$= -2x^{-3} = -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = \frac{d}{dx} x^{-2} = -2x^{-3} = -\frac{2}{x^3}$$

$$= -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$$

$$\frac{d}{dx} \left(\frac{1}{x^2} \right) = -\frac{2}{x^3}$$



$$\angle PQR = \frac{1}{2} PQR'$$

PAQ = PQR

PAQ = PQR

PAQ = PQR

u

u = PQR - PQR



Let $\angle AOB = \theta$
 Then $\angle AOB = 2\theta$

$$\angle AOB = 2\theta$$

Let $OA = OB = r$
 Then $AB = 2r \sin \theta$



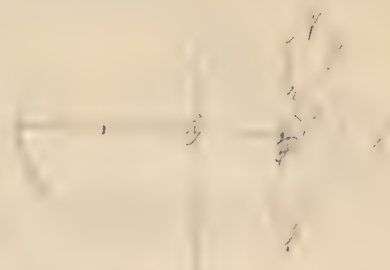
$$AB = 2r \sin \theta$$

$$AB = 2r \sin \theta$$

$$AB = 2r \sin \theta$$

$$\begin{aligned} AB &= 2r \sin \theta \\ &= \frac{1}{2} (2r \sin 2\theta) \\ &= r \sin 2\theta \end{aligned}$$

[Faint, mostly illegible handwriting]



[Faint handwritten notes, possibly describing the diagram or a related concept]

Mage. R...

$$A = a(1 - x')$$

... of ...

1. $\frac{1}{x} = x^{-1}$

$$\frac{d}{dx} x^{-1} = -x^{-2}$$

$$= -\frac{1}{x^2}$$

$$= -\frac{1}{x^2}$$

$$\frac{d}{dx} \frac{1}{x} = -\frac{1}{x^2}$$

$$1. \frac{d}{dx} \frac{1}{x} = -\frac{1}{x^2}$$

$$= -\frac{1}{x^2}$$

$$= -\frac{1}{x^2}$$

$$= -\frac{1}{x^2}$$

$$F(x) = \frac{1}{x}$$

$$f(x) = \frac{1}{x}$$

$$f(x) = \frac{1}{x}$$

$$f(x) = \frac{1}{x}$$

$$f(x) = \frac{1}{x}$$

$$f(x) = \frac{1}{x}$$

$$f(x) = \frac{1}{x}$$

graph of $y = \frac{1}{x}$

1/5 - 1/5

8. 1/2

1/2

1/2

1/2

1/2

1/2

1/2

1/2

1/2

1/2

1. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

2. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

3. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

4. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

5. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

6. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

7. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

8. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

9. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

10. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

11. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

12. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

13. $\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$

$$\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$$

$$\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt}$$

$$\frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = m v \frac{dv}{dt} = 2 k v$$

4

10.11



1. The area of a circle is given by the formula $A = \pi r^2$.
 2. The circumference of a circle is given by the formula $C = 2\pi r$.
 3. The area of a sector of a circle is given by the formula $A = \frac{\theta}{360} \pi r^2$.

4. The length of an arc of a circle is given by the formula $L = \frac{\theta}{360} 2\pi r$.
 5. The area of a segment of a circle is given by the formula $A = \frac{\theta}{360} \pi r^2 - \frac{1}{2} r^2 \sin \theta$.
 6. The area of a circular ring is given by the formula $A = \pi (R^2 - r^2)$.
 7. The area of a circular sector is given by the formula $A = \frac{1}{2} r^2 \theta$.

$$f = \frac{m}{\sqrt{1 - \frac{v^2}{c^2}}} \quad \frac{f'}{f} = - \frac{2v}{c} \frac{v}{1 - \frac{v^2}{c^2}}$$

— 21 —

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— 29 —

— 30 —

— 31 —

— 32 —

— 33 —

— 34 —

— 35 —

— 36 —

$$\frac{(m^2 - m_j^2) + a_j(m^2 - m_j^2)}{2m(m^2 - m_j^2)} = \frac{m(m^2 - m_j^2)}{2m(m^2 - m_j^2)} = \frac{1}{2}$$

$$y^2 = 2px$$

$$y^2 = 2px$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$

$$y^2 = 2px + x^2/p$$



100

— 4 —

1

2. 1. 1. 1.

g. - 2 - 10

1

1878

2. *Adiantum*

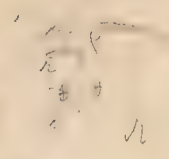
1892 - 7

10

1874

$$w = -f$$

1. 1. 1. 1. 1.



... ..
... ..
... ..

$$\text{...} \leq \frac{\dots}{\dots} = \dots$$

$$x = \dots \quad \text{...} = \frac{x+h}{\dots}$$

... ..

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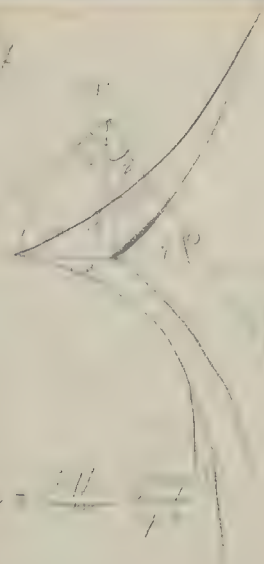
... ..

... ..

... ..

$$T, A = 1$$

11



$$y = \frac{11}{x}$$

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$$y = \frac{11}{x}$$

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$$y = \frac{11}{x}$$

$$y = \frac{11}{x}$$

$$y = \frac{11}{x}$$

$$y = \frac{11}{x}$$

$$y = \frac{11}{x}$$

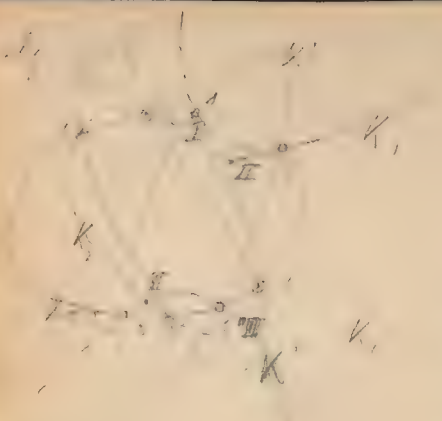
$$y = \frac{11}{x}$$

$$y = \frac{11}{x}$$

Handwritten text, possibly a signature or note.

$$y = \frac{11}{x}$$

$$y = \frac{11}{x}$$



$K - A K' = 0$
 $K - A K' = 0$
 $K - A K' = 0$

$K_1 - K$

$K - A K' = 0$

$K' - A K' = 0$

$K - A K' = 0$

$K - A K' = 0$

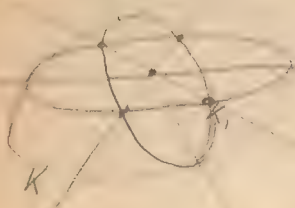
$K - A K' = 0$

$K - A K' = 0$

Let us consider the case

$K_1 - A K' = 0$

$K_2 - A K' = 0$



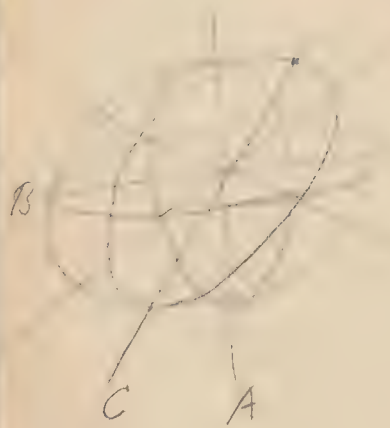
B

$K_1 - K_2 = 0$

$A - A K' = 0$

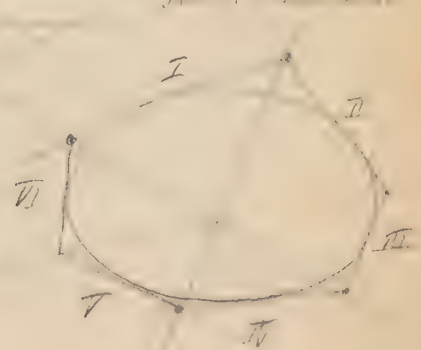
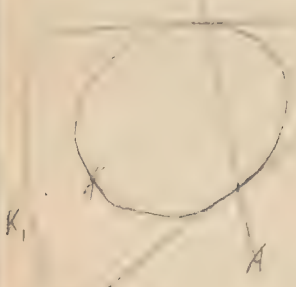
$A - A K' = 0$

2.2.1. ... of the ...



A line

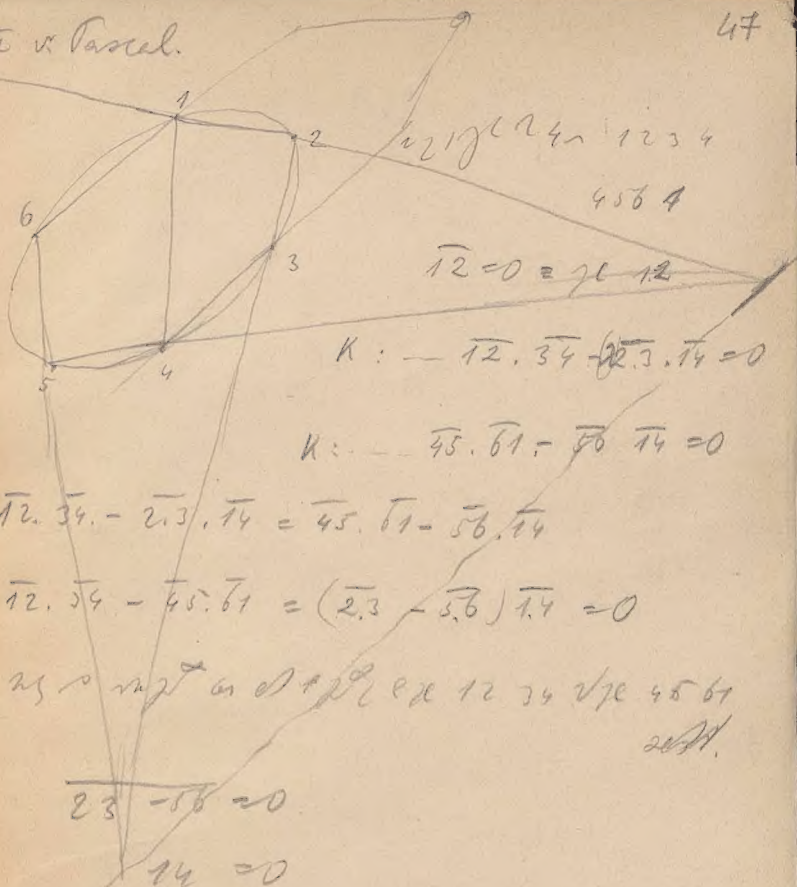
2.3.1.



$I, IV \dots K_1$
 $II, V \dots K_2$
 $III, VI \dots K_3$

Sato & Pascal.

47



12 13 14 15 16

4564

$12 = 0 \Rightarrow 12$

$K: \quad 12 \cdot 34 - 23 \cdot 14 = 0$

$K: \quad 45 \cdot 61 - 56 \cdot 14 = 0$

$12 \cdot 34 - 23 \cdot 14 = 45 \cdot 61 - 56 \cdot 14$

$12 \cdot 34 - 45 \cdot 61 = (23 - 56) \cdot 14 = 0$

23 ~ 24 ~ 25 ~ 26 ~ 27 ~ 28 ~ 29 ~ 30 ~ 31 ~ 32 ~ 33 ~ 34 ~ 35 ~ 36 ~ 37 ~ 38 ~ 39 ~ 40 ~ 41 ~ 42 ~ 43 ~ 44 ~ 45 ~ 46 ~ 47 ~ 48 ~ 49 ~ 50 ~ 51 ~ 52 ~ 53 ~ 54 ~ 55 ~ 56 ~ 57 ~ 58 ~ 59 ~ 60 ~ 61 ~ 62 ~ 63 ~ 64 ~ 65 ~ 66 ~ 67 ~ 68 ~ 69 ~ 70 ~ 71 ~ 72 ~ 73 ~ 74 ~ 75 ~ 76 ~ 77 ~ 78 ~ 79 ~ 80 ~ 81 ~ 82 ~ 83 ~ 84 ~ 85 ~ 86 ~ 87 ~ 88 ~ 89 ~ 90 ~ 91 ~ 92 ~ 93 ~ 94 ~ 95 ~ 96 ~ 97 ~ 98 ~ 99 ~ 100

$23 - 56 = 0$

$14 = 0$

Pascal-Sato

BJ

